

Temperature effects on Fish Predation

Standard 3240-02 Students will investigate changes in biological energy.

Objective 3240-0201 Relate energy requirements of plants and animals to physical and chemical changes.

Formulate and test a hypothesis on the effects of temperature or light on plant and animal processes.

Intended Learning Outcomes

Making observations, identifying variables, collect and record data, Use language of science to communicate, use numbers to represent data collected and graph the data collected.

Duration: 1 45-minute class period to set up the lab, 1 45-minute class period to do the lab and 1 45-minute class period to finish the lab write-up.

Materials (per group of students):

- thermometer
- timer
- tank
- fish (guppies or goldfish)
- several brine shrimp of two sizes (large and small)
- 5 containers for brine shrimp
- 2 micro-pipets

Facilities: access to water and a larger tank in which to keep the fish.

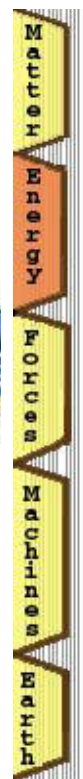
Background Information: Brine shrimp can be obtained from the Great Salt Lake or hatched from over-wintering eggs (cysts). To hatch them follow the directions given in a hatching lab, or order them from a supply company. Cysts can be obtained from supply companies, or from a pet store (sold as fish food)

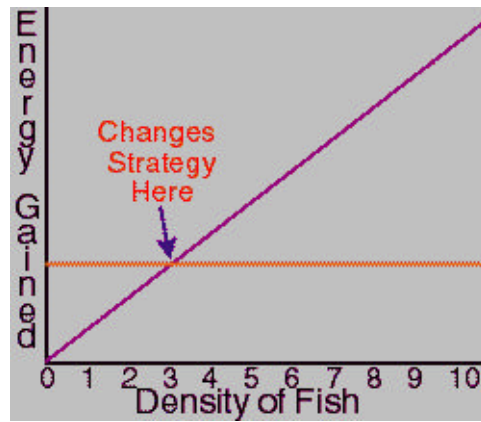
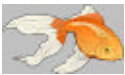
Teaching Strategies: For the observations step use a 5 inch petri dish to show the feeding of a large and a small brine shrimp to a fish.

Have the students time the handling time for a fish to eat each size of shrimp. Then calculate the profitability of eating each of the shrimp. $P = cs / Th$...where P is profitability, cs is calories from the two sizes of shrimp and Th is the handling time for each of the two sizes of shrimp. Make sure that the students do the required calculations. If possible, help the students design the charts and graphs. The math component of this lab is important. Make sure that all students have a hypothesis recorded before beginning the experiment. The room temperature group is the variable.

Invitation to Learn: See the observations section of the student handout. Consuming a small shrimp contributes 1.35 calories to the fish. Consuming a large shrimp contributes 2.69 calories to the fish. How long does it take a fish to eat a big shrimp? (Use the fish on the overhead with the students using stop watches to time how long it takes the fish to eat the shrimp.) How long does it take the fish to eat a small shrimp? (Use the fish on the overhead with the students using stop watches to time how long it takes the fish to eat the shrimp.) Have the students calculate the profitability of eating each size of shrimp. Given a choice of small and large shrimp, which would you predict the hungry fish would eat? (According to the graph it should not be picky.) If the food was unlimited, which food do you predict the fish would eat? (According to the graph it should not be picky.) If there were several fish, and a limited supply of shrimp, which would the fish go after first? If there were several fish and an unlimited supply of food which would they go after first? (According to the graph it pays to be picky.) Show the students the graph of Optimal Foraging Curves and discuss it. The point where the two curves cross is the 3 fish. If there are less than three fish foraging, then it doesn't pay to be picky. If there are three or more fish foraging, then it does pay to be picky.

Optimal Foraging Curves

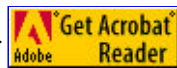


**Safety concerns:**

Teachers and students, be sure to keep all Animal Safety Rules that are specified by your teacher and in all general laboratory experiences.



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Updated August 7, 2000 by: [Glen Westbrook](#)

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